Threatened and Endangered Species: What Landowners Should Know

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What is an Endangered Species?

The term "endangered species" became part of our language in 1973 when Congress passed the Endangered Species Act (ESA). This act was developed in an effort to curb the increasing rate of extinction of the world's living organisms. The act and its amendments have been called the most comprehensive legislation ever passed to enhance the preservation of endangered organisms. This act empowered our government to identify those species of plants and animals that should be classified as endangered or threatened based on scientific evidence. **Endangered species** are those that will probably become extinct unless protected, and **threatened species** are likely to become endangered in the foreseeable future.

The act prohibits anyone from harassing, capturing, or killing any protected species. It also required that federally-authorized, funded, or implemented actions not jeopardize the continued existence of a listed species. Other sections of the act provided guidelines for the recovery of listed species and encouraged the development of complementary programs by the states.

It was Congress' intent not only to stem the tide of species extinctions but to recover listed species to the point where protection was no longer needed. The intent has never been to stop any commercial, urban, or industrial development or management activities.

Red-cockaded woodpecker

To date, approximately 1,100 species have been designated as endangered or threatened worldwide. However, more than 3,600 have been identified as candidates for endangered or threatened status and are awaiting official action. Unfortunately, the listing process is hampered by inadequate funding and staff shortages, and at least 34 plant and animal species have become extinct while awaiting review for protection under the act.

Currently, 69 South Carolina species (plant and animal) are classified as endangered or threatened (federal and/or state listing). In addition, many others are listed as "elements of concern" by the SC Department of Natural Resources.

Passage of the Act has brought the plight of endangered species to daily newspapers and popular magazines and elevated public awareness about the consequences of extinction to man. This recognition has also resulted in the development of endangered species programs or laws to protect rare plants and animals in nearly all states.

A growing number of states, like South Carolina, recognize the value of protecting the entire spectrum of natural diversity and have developed programs to do so. In cooperation with the states, Section 6 of the act authorizes funds to conserve federally listed species. In 1974, the Nongame and Endangered Species Conservation Act was passed by the South Carolina state legislature. It contained provisions for endangered species similar to those of the federal act. These include research, listing, management and law enforcement. This legislation specifically qualified South Carolina for a Cooperative Agreement with the Department of Interior under Section 6.

The state act also established a nongame program for "species in need of management." These are species in South Carolina which need conservation assistance but may not be on the federal list. South Carolina was among the first states in the nation, and the first in the Southeast, to sign a Cooperative Agreement.

The state legislature also passed the Heritage Trust Act in 1976. This act gave the South Carolina Department of Natural Resources (SCDNR) the authority to conserve plants and to acquire habitat for it's natural areas program.

In 1979, the wildlife department's Nongame and Endangered Species and Heritage Trust Sections merged. Soon after this, in 1981, a second Cooperative Agreement under Section 6 was signed for the conservation of endangered plants. The combined programs are now administered by the South Carolina Department of Natural Resources, which maintains a list of known locations of endangered plants and animals.

Other state and federal agencies, the public, and developers use this information to plan their activities in our state. The SCDNR tracks rare animal species on a separate database called the Fish and Wildlife Information System.

Why Do Species Become Rare and Extinct?

How often have you heard your parents or grandparents say, "I remember when we used to get a lot of snow in the winter, but now we just don't get as much." Today, newspaper articles nearly each week mention global warming, hurricanes, volcanic eruptions, and devastating floods. The Earth is constantly changing: mountains are formed and slowly erode away, ice ages come and go, the oceans rise and fall, and continents drift apart and collide. Stability on Earth is short-lived and certainly not the rule.

The Earth is an Ever-Changing Place

What does all this have to do with why species become rare or extinct? Extinctions occur because species cannot adapt to environmental changes. When the thermometer drops to zero during winter, we grumble as we turn up the thermostat in our homes and bundle up in thick sweaters and coats before going outside. Animals and plants cannot protect themselves in the same ways from weather. They must be able to endure the cold, become dormant, or migrate to warmer climates, or they will die. Every species adapts to its environment or perishes. Some have very broad tolerances and survive over large areas. Others have very narrow requirements and are restricted to small areas. In most cases, we cannot explain why such variation occurs, but it does. We do know that every species is the product of tens of thousands or millions of years of adaptation and interaction with the environment, and that its characteristics and life requirements have become genetically programmed.

Why Care about Extinctions Caused by Humans?

"Why should I care that species are going extinct?" is a universal question most people ask when confronted by the issue of endangered species. Discussions about this issue often become impassioned when they involve a controversial development project. Several years ago, a major controversy developed in the Pacific Northwest over the cutting of our ancient forests and the loss of the northern spotted owl.

In South Carolina, less publicized debates occurred regarding the listing of the red-cockaded woodpecker as a Federally Endangered species. The controversy centers around the fact that some people see no value or reason to protect species that they believe add nothing to humans or their existence.

All species are valuable, and we should be concerned about the potential loss of even the lowest form of life. Most people acknowledge that humans are obligated to be good stewards of the planet. What right do humans, just one of perhaps 5 to 30 million species, have to extinguish other species? All too often we are good stewards only if it is convenient and apparently costs us nothing.

The beauty of organisms with which we share the Earth is another reason for their preservation. We spend billions of dollars to acquire, protect, and enjoy beautiful works of art and music. The world is outraged when vandals attack centuries-old sculptures and paintings. But have you ever looked closely at a dragonfly, a woolly worm, or a prothonotary warbler? Their beauty and intricacy certainly rival the finest works of arts. Aside from arguments that species should be protected out of a sense of compassion or because of their beauty, there are economic reasons for preserving the Earth's species. In the mid-1980s, scientists isolated a compound called cyclosporine from a plant belonging to the mushroom family. It was found that cyclosporine had the ability to suppress the rejection response of people undergoing tissue transplants. Since the introduction of this drug, the success of heart, lung, liver, kidney, and bone marrow transplants has increased dramatically. This drug has saved thousands of people and has improved their quality of life. If we had eliminated the plant from which cyclosporine is produced, thousands of people now living normal lives would have died.

Every species is an encyclopedia of genetic information, a reservoir of biologically active compounds. If we consider that the lowliest bacterium may have 1,000 genes and that many flowering plants and some animals have 400,000 genes, every species is a hidden treasure chest of information that may be important to humans. So far, we have barely begun to unlock the potential benefits of the world's plants and animals.

Current estimates suggest that 1 in 3 Americans will contract some form of cancer in their lifetime. Consider for a moment that only about 35,000 of the Earth's 250,000 flowering plant species have been screened for anti-cancer activity. We truly have just begun the quest that could save lives. Nearly 25% of all prescription medicines in the United States contain active ingredients originally extracted from plants. With the extinction of every species, we may be recklessly destroying the opportunity to cure diseases like leukemia, heart disease, multiple sclerosis, or AIDS.

Another of society's ills that plants and animals might be able to cure is world hunger. The majority of humanity relies on only three plant species (corn, rice, and wheat) for their basic nourishment, and only about 20 species provide the major source of food for all of mankind. In human history, only about 3,000 plant species have been used for food, or about 1% of all plant species on Earth. Scientists estimate there are at least 75,000 edible plant species. If we consider animals, nearly all protein that humans consume from domesticated animals comes from less than a dozen species. How many more animals could be domesticated? While most people in the United States are generally well fed, many of our citizens and much of the world is starving. Again, we must ask, are we shutting the door on the starvation problem by accelerating the extinction of the world's plants and animals?

Perhaps the most compelling argument to conserve species is that all life is interwoven into the delicate fabric that supports life on Earth. It is impossible to eliminate one species without affecting the whole. All species are part of the food web that cycles nutrients and energy. Each

plays a role in maintaining the quality of our atmosphere and water, the productivity of our soils, and the moderation of our climate. Each species can be likened to the bricks of a house. Every brick contributes to the support and integrity of the house. What would happen if you slowly and randomly started to remove bricks? A few bricks could be removed with minimal results. However, as more bricks are removed, cracks would develop in the walls, the roof would sag, and leaks would appear. At some point that we cannot predict, the entire structure would collapse and the house would turn to rubble.

No one knows just how many species can be lost without the crumbling of our ecosystem and the end of life on Earth as we know it. No one can predict when the catastrophe will strike. However, it is certain that we are eroding the fabric of life with each species we push to extinction. The truly sad part of this situation is that all of the benefits these organisms provide man are free if we allow all species to survive and function in a healthy ecosystem.

What Are Some of South Carolina's Endangered Species?

Species currently protected under the Endangered Species Act and under review for possible protection under the act are listed in Table 1. (Not all the species found on the nonregulatory list maintained by the SCDNR are listed.) The plants and animals on these lists are rare, and you probably have never heard of them, much less seen many of them. South Carolina harbors slightly more than 3,000 different species or subspecies of native and naturalized vascular plants. Almost 300 are presently considered rare, threatened or endangered. This represents nearly 10 percent of the state's native flora.

The large number of plant species, in general, and endangered or threatened species, in particular, directly reflects the tremendous diversity of habitat types across South Carolina. South Carolina contains part of four physiographic provinces: the Blue Ridge Mountains, the Piedmont, the Coastal Plain and the Fall Line Sandhills. The SCDNR Plant Community Classification System contains descriptions of 105 different plant communities, each of which may contain a number of different habitat types.

A discussion of plant rarity or endangerment is really a discussion of habitat; any attempts to protect a plant should constitute attempts to protect the habitat of the species. Although protection through propagation or transplantation may be necessary occasionally, these species should not be the primary means of protecting an endangered species. Ensuring endangered species' native habitats is by far the most desirable means of protection.

A plant is considered endangered when its population level is naturally low or has become reduced throughout all or a significant portion of its range, or its natural habitat has been altered and/or reduced to such an extent that reproductive populations are vulnerable to extirpation. There are several definitions that reflect the different listing categories. They are: 1) a national concern, endangered or threatened throughout its range in the United States; 2) regional concern, endangered or threatened throughout a significant portion of its range that includes South Carolina and other states in and out of the region; 3) statewide concern, endangered or threatened in South Carolina; and 4) status unresolved, insufficient information is available on which to base a careful determination of status.

The keys to these definitions are low population level (rarity) and vulnerability. Virtually every rare plant species in South Carolina is potentially threatened by habitat modification due to today's technological advancements. The boggiest swamps can be drained or mined for peat; the steepest, rockiest slopes can be timbered. More subtle, development-related threats can occur through increased recreational use or accessibility.

The SCDNR and the South Carolina Nature Conservancy cooperate in an ongoing effort to protect the most significant endangered and threatened plants. A great deal has been accomplished. To date, 12 significant rare plant habitats have been acquired by purchase or donation. At least 40 different plants which are rare in South Carolina have been protected by this means, including 8 species endangered or threatened throughout their entire range. Registration agreements with the owners of 7 different tracts provide a lesser degree of protection for an additional 32 endangered and threatened species. To date, more than 72 of the 300 or so endangered, threatened and concerned species in South Carolina have been protected with at least some degree of habitat protection.

An unofficial list of South Carolina's rare, threatened or endangered species was compiled in 1984 by the South Carolina Advisory Committee on Rare, Threatened and Endangered Species. The list includes 43 species of national concern, 34 species of regional concern, 85 species of statewide concern, and 132 species listed as status unresolved. Forty-six of these species are federally listed as endangered or threatened under the Endangered Species Act. An additional 60 species are under status review for listing as potential federal endangered or threatened species.

If you know of locations for any species that are endangered or threatened, have recommendations concerning endangerment of additional species, or would like to participate in future revisions of listings contact: Botanist, SCDNR, P.O. Box 167, Columbia, SC 29202.

What Can Landowners Do to Help Endangered Species?

South Carolinians interested in protecting rare plants and animals on their property first should determine the kinds of habitats present. However, the presence of any of these habitats only suggests the potential for rare and endangered species.

Have an On-Site Inspection

The presence of rare or endangered species can only be determined by an on-site inspection by a qualified biologist. In lieu of an examination of the property, the SCDNR can determine if rare organisms are known

Table 1. Federal and State Threatened and Endangered Species in South Carolina

Scientific Name	Common Name
Plants	
Sagittaria fasciculata	Arrowhead, bunched
Aster avitus	Aster, Alexander's rock
Ptlimnium nodosum	Bishop's weed, a mock
Oxypolis canbyi	Dropwort, Canby's
Asplenium heteroresiliens	Carolina spleenwort
Hymenophyllum tunbridgense	Fern, Tunbridge
Ribes echinellum	Gooseberry, miccosukee
Vaccinium sempervirens	Huckleberry, Rayner's
Lysimachia asperulaefolia	Loosestrife, rough-leaved
Platanthera integrilabia	Orchid, white fringeless
Sarracenia jonesii	Pitcher-plant, mountain sweet
Isotria medeoloides	Pogonia, small whorled
Lindera melissifolia	Pondberry
Pyxidanthera barbulata	Pyxie-moss, Sandhills
Isoetes melanospora	Quillwort, black-spored
Helianthus schweinitzii	Sunflower, Schweinitz's
Coreopsis latifolia	Tickseed, broad-leaved
Trillium persistens	Trillium, persistent
Trillium reliquum	Trillium, relict
Draba aprica	Whitlow-wort
Kalmia cuneata	White-wicky
Cornus foeminia, racemosa	Dogwood, gray-stemmed
Dryopteris goldiana	Fern, Goldie's
Stillingia aquatica	Queen's-delight
Carex folliculata	Sedge, long
Schoenolirion croceum	Sunnybell
Psilotum nudum	Whiskfern
Unionids (Mussels)	
Fusconaia masoni	Atlantic Pigtoe Mussel
Elliptio fraterna	Brother Spike Mussel
Lasmigona decorata	Carolina Heelsplitter
Amphibians	
Ambystoma cingulatum	Flatwood Salamander
Plethodon websteri	Webster's Salamander
Pseudonbranchus spp.	Dwarf Siren
Hyla andersonii	Pine Barrens Tree Frog
Reptiles	
Chelonia mydas	Green Sea Turtle
Eretmochelys imbricata	Hawksbill Turtle
Lepidochelys kempii	Kemp's Ridley Turtle

Scientific Name	Common Name
Reptiles (continued)	
Dermochelys coriacea	Leatherback Turtle
Caretta caretta	Loggerhead Turtle
Drymarchon corias couperi	Eastern Indigo Snake
Gopherus polyphemus	Gopher Tortoise
Clemmys muhlenbergii	Bog Turtle
Eumences anthracinus	Coal Skink
Fish	
Acipensier brevirostrum	Shortnose Sturgeon
Etheostoma collis collis	Carolina Darter
Semothilus lumbee	Sandhills Chub
Birds	
Campephilus principalis	Ivory-billed Woodpecker
Haradrius melodus	Piping plover
Charadrius wilsonia	Wilson's plover
Dendroica kirtlandii	Kirtland's warbler
Falco peregrinus tundrius	Arctic Peregrine falcon
Falco peregrinus anatum	American Peregrine falcon
Haliaeetus leucocephalus	Bald eagle
Mycteria americana	Wood stork
Picoides borealis	Red-cockaded woodpecker
Sterna antillarum	Least tern
Vermivora bachmanii	Bachman's warbler
Numenius borealis	Eskimo Curlew
Elanoides forficatus	American Swallow-tailed Kite
Thrymanes bewickii	Bewick's Wren
Columbina passerina	Common Ground Dove
Plegadis falcinellus	Glossy Ibis
Mammals	
Felis concolor cougar	Eastern cougar
Myotis sodalis	Indian myotis
Myotis leibii	Small-footed bat
Plecotus rafinesquii	Rafinesque's big-eared bat
Eubalanea glacialis	Atlantic Right Whale
Balaenoptera musculus	Blue Whale
Balaena mysticetus	Bowhead Whale
Balaenoptera physalue	Finback Whale
Megatera novaeangliae	Humpback Whale
Balaenoptera borealis	Sei Whale
Phseter catadon	Sperm Whale
Trichechus manatus	Florida Manatee

in your county or nearby area (their address and website is found at the end of this document). Any request for information should include a map and general description of the area of interest.

You should note that the distribution of plants and animals can be very complex, and many times is poorly understood. Therefore, nearly all land that has not been developed intensively has some potential for harboring rare species. If these organisms are found on a landowners property, technical advice can be provided by the SCDNR for assistance in their protection.

A special note should be made regarding caves. If there is a cave located on a landowners tract, they should feel especially lucky because every cave is unique. Many cave-dwelling organisms are rare, and the caves they inhabit are extremely fragile and easily-damaged habitats. Interested landowners who own a cave may want to contact the SCDNR for assistance in evaluating and protecting this resource. When important caves are located, these agencies can provide advice on management issues such as visitation, sign use, and legal protection that landowners can use to protect their caves.

Unfortunately, there are no comprehensive publications specifically addressing endangered species that landowners can use to guide the management of their property. However, many publications address ways to minimize environmental impacts associated with activities such as agriculture, construction, and forestry practices. For forestry, the South Carolina Forestry Commission has developed "best management practices" (BMP's) which are recommended to minimize water pollution and environmental harm. The Clemson University Cooperative Extension Service also has a handy publication entitled *A Guide to South Carolina's Endangered and Threatened Species* that can be obtained for $9.50 from the Clemson University Public Service Publishing web site at http://dprod4.clemson.edu/olos. This guide provides photographs and descriptions of the federally threatened and endangered species in South Carolina.

Be Aware of Pesticide Use

Because some pesticides may harm endangered and threatened species, the Environmental Protection Agency (EPA) has been developing an Endangered Species Protection Program (ESPP) to protect vulnerable species and their habitats from the effects of pesticides. EPA began developing this program in 1982, and published an initial proposal in 1987 and 1988. The proposal has since undergone revision and now concentrates on providing the best protection for threatened and endangered species themselves. This effort was begun to comply with Section 7 of the Endangered Species Act as amended. To minimize impacts on pesticide users, EPA will evaluate pesticides with emphasis on lower application rates as opposed to complete prohibition of use.

South Carolina's endangered and threatened species most likely to be affected by pesticide use include the Southern bald eagle, American peregrine falcon, select bats, mussels, red-cockaded woodpeckers, and plants. Adverse pesticide use can affect these species for several reasons; therefore, precautions should be taken when spraying pesticides. An example would be the hazard of pesticides contaminating streams which are homes to mussels. Under provisions of the Endangered Species Act, pesticide misapplication may be considered either harassing or harming wildlife in the context of definitions provided in the act.

The following is a general description of how ESPP works. The first component is called labels and bulletins. Generic label statements instruct pesticide users to consult county bulletins for use limitations. The next part of ESPP is state involvement. Some states are developing their own endangered species protection programs; others are developing education and training programs and maps which define affected habitats.

The final component of the program provides an exemption for indoor uses in the case of a public health emergency where expeditious control of disease vectors, such as mosquitoes or fleas, is required.

Consider Individual Impacts on the Environment

Finally, there are many things that individuals can do to protect endangered species wherever they occur. First, educate yourself about the problem. You can do this by reading about the subject or by joining a state or national conservation organization that is concerned about the environment and loss of biological diversity.

- *Examine your lifestyle and seek ways to minimize your impact on the environment*. Have you considered starting a home recycling program? You can get the whole family involved by separating newspaper and other paper products, engine oil, aluminum and steel cans, glass, and recyclable plastic containers and taking them to a recycling center. You will be actively helping to save resources and earn some money too.
- *Have you thought of using a water-saving shower head or altering the tank on your toilet bowl so you use less water?* This will also save you money and protect our rivers and streams.
- *Become an educated consumer!* Buy products that are reusable, recyclable, environmentally safe, and energy efficient.
- *Talk to your elected officials about environmental issues,* and let them know that you will stand behind them to support environmental legislation.
- *Support the work of state and federal agencies* that are attempting to protect the environment.

Another way of supporting the work of federal agencies is to purchase a migratory bird stamp at your local post office. Monies received from the sales of these stamps goes toward purchasing valuable wetland habitats. Whether or not you own land that harbors endangered species, you can play an important role in protecting part of a part of our natural heritage, endangered species.

Where To Find More Information about Endangered Species

You can learn more about endangered species by contacting the following organizations:

South Carolina DNR
P.O. Box 167
Columbia, SC 29201
www.dnr.sc.gov

United States Fish and Wildlife Service
Endangered Species Field Office
160 Zillicoa
Asheville, NC 28801
www.fws.gov/asheville/

United States Fish and Wildlife Service
PO Box 12559
Charleston, SC 29422-2559
www.fws.gov/charleston/

Extension Wildlife Program
Department of Forestry and Natural Resources
272 Lehotsky Hall
Clemson University
Clemson, SC 29634
www.clemson.edu/cafls/departments/forestry/